**Claims:**

1. A valve assembly for controlling the flow of a predetermined fluid, comprising:

a tube having an open end forming an outlet port of the valve assembly, and wherein the tube is made of a material that is porous with respect to the predetermined fluid;

an outer wall forming a fluid chamber coaxially surrounding the porous tube and including an inlet port of the valve assembly; and

a valve member made of non-porous material with respect to the predetermined fluid and received for sliding movement within the porous tube, wherein sliding movement of the valve member within the tube and towards the open end of the tube reduces flow of the predetermined fluid from the fluid chamber, through the porous tube and through the outlet of the valve assembly, while sliding movement of the valve member within the tube and away from the open end of the tube increases flow of the predetermined fluid from the fluid chamber, through the porous tube and through the outlet of the valve assembly.

2. A valve assembly according to claim 1, wherein the porous tube, the outer wall and the valve member are each made of a metal.

3. A valve assembly according to claim 1, wherein the porous tube, the outer wall and the valve member are each made of stainless steel.

4. A valve assembly according to claim 1, further comprising an actuator connected to the valve member for causing sliding movement of the valve member within the porous tube.

5. A valve assembly according to claim 4, wherein the actuator comprises an electromechanical actuator.

6. A valve assembly according to claim 5, wherein the actuator comprises a voice coil linear actuator.

7. A valve assembly according to claim 6, wherein the voice coil linear actuator includes a position sensor for providing an indication of an axial position of the valve member within the tube.

8. A flow controller including a valve assembly according to claim 7, and further comprising a control device connected to the voice coil linear actuator and programmed to receive a desired flow rate from a user input device, receive an indication of axial position of the valve member within the tube from the position sensor, determine an actual flow rate through the flow controller based on the axial position of the valve member, and cause the voice coil linear actuator to open further if the actual flow rate is less than the desired flow rate and cause the voice coil linear actuator to close further if the actual flow rate is greater than the desired flow rate.

9. A flow controller according to claim 8, and further comprising:

an inlet flow path connected to the inlet port of the valve assembly; and

a pressure sensor connected to the inlet flow path for sensing an inlet pressure of the flow controller, wherein the pressure sensor is connected to the control device and the control device is programmed to determine the actual flow rate based upon variations in the inlet pressure.

10. A flow controller according to claim 8, wherein the control device is further programmed to determine the actual flow rate based upon variations in ambient temperature.

11. A flow controller according to claim 8, wherein the control device is further programmed to determine the actual flow rate based upon properties of the predetermined fluid, including temperature.

12. A semiconductor manufacturing system including the flow controller of claim 8 and further comprising a source of process gas connected to a process chamber through the flow controller.

13. A valve assembly according to claim 1, wherein the porous tube has an average diameter of about 4 mm.

14. A valve assembly according to claim 1, wherein the porous tube has a height of about 1.1 cm.

15. A valve assembly according to claim 1, wherein the porous tube has a thickness of about 1 mm.

16. A valve assembly according to claim 1, wherein a total flow through the valve assembly is about 10 SLM.

17. A valve assembly according to claim 1, wherein a clearance between the valve member and the tube is about 0.06 mils.

18. A valve assembly according to claim 1, wherein a force of about 2 lbs. is required to move the valve member within the porous tube.

19. A valve assembly according to claim 1, wherein the valve member is spherical.

20. A valve assembly according to claim 19, wherein the spherical valve member has a diameter of about 3 mm.